TITLE

MULTICHANNEL IMAGE PROCESSOR AND SECURITY SYSTEM EMPLOYING THE SAME

CLAIM OF PRIORITY

This application makes reference to, incorporates the same herein, and claims all benefits accruing under 35 U.S.C. § 119 from my application *MULTICHANNEL IMAGE PROCESSOR AND SECURITY SYSTEM EMPLOYING THE SAME* filed with the Korean Industrial Property Office on 14 July 2001 and there duly assigned Serial No. 42645/2001.

BACKGROUND OF THE INVENTION

Technical Field

The present invention relates to a multichannel image processor and a security system employing the same, and more particularly to a multichannel image processor capable of displaying signals transmitted from a plurality of security cameras after selectively receiving signals and recording the signals, and the security system employing the same.

Related Art

A security system employing a switching unit can display, record and reproduce images by selectively receiving transmitted images from a plurality of cameras installed to photograph an inside or an outside of a building that must be watched.

1   The security system employing a switching unit has been used because such a security system

2   has some advantageous aspects such as reducing manpower needed to watch a building, or providing

3   recorded information of an object. However, it requires special equipment that is expensive,

4   inconvenient, and inflexible.

5   I have found that there is a need for a new security system that utilizes the resources of a

6   computer to provide improved flexibility, convenience, and affordability.

SUMMARY OF THE INVENTION

      The present invention has been made to overcome the above-mentioned problems of the

related art. Accordingly, it is an object of the present invention to provide a multichannel image

10   processor and a security system employing the same capable of increasing the utility of resources by

11   using resources of a computer so that the computer can support watching and recording an object,

12   and mitigating the limit of the space needed for installing.

13   Another object of the present invention is to provide a multichannel image processor and a

14   security system employing the same capable of remote controlling the movement of a camera from

15   a user's computer, and setting up a function supported from the camera.

16   The security system employing the multichannel image processor includes: a multichannel

17   image processor for selectively receiving image signals transmitted through a plurality of input

18   channels and outputting the image signals; and a user's computer connected with the multichannel

19   image processor through a communication interface. The user's computer is for controlling a

20   channel selection of the multichannel image processor in accordance with a set-up mode, displaying

1   signals input from the multichannel image processor through a display device corresponding to the

2   set-up mode and/or record in a memory, supplying a main image display window for displaying the

3   transmitted image signals and a manipulation key window for displaying keys for selecting the mode

4   to be integrally displayed on a main frame, and having a multichannel image driver to process in

5   accordance with a selected key.

6   Preferably, the multichannel image processor has: a plurality of memories for storing signals

7   input through the plurality of input channels, respectively; a memory controller for selectively

8   outputting the signals stored in the plurality memories in accordance with a control signal; a coding

9   unit for coding the signals output from the plurality of memories and transmitting the coded signals

10   to the user's computer; and a main controller for controlling the memory controller in accordance

11   with the control signal transmitted from the user's computer.

12   The multichannel image processor further comprises a plurality of A/D converters disposed

13   respectively between each of the plurality of input channels and each of the plurality of memories

14   in order to convert the input signals into digital signals.

15   The multichannel image processor further comprises a multiplexer for multiplexing the

16   signals input through the plurality of input channels and outputting the multiplexed signals via a

17   terminal for an external displayer.

18   The multichannel image processor further comprises an alarm sensor for sensing an

19   abnormality of an object to be watched, wherein the main controller transmits received information

20   of an abnormality signal to the multichannel image driver when the abnormality signal is transmitted,

21   and operates an alarm channel selection mode corresponding to the abnormality signal under a

1   control of the multichannel image driver.

2   The multichannel image driver records and displays image signals of a corresponding camera

3   for a predetermined time when the abnormality signal is transmitted. Preferably, more than one

4   photographing apparatus is connected with the plurality of input channels, the photographing

5   apparatus being capable of controlling a photograph direction thereof in accordance with a control

6   signal, wherein the multichannel image driver has basic photograph keys disposed on the

7   manipulation key window in order to manipulate functions supported by the photographing

8   apparatus, and controls the photographing apparatus through the multichannel image processor so

9   as to correspond to the manipulation of the basic photograph keys. The basic photograph keys

10   include a focus adjust key, a zoom in/out adjust key, and a photograph direction manipulation key.

11   The zoom in/out adjust key can be referred to as a zoom adjust key.

12   It is more preferable that the photograph direction manipulation keys are displayed as a mark

13   having a predetermined shape on an initial point in a direction display window for displaying a

14   direction guide information for guiding a photograph adjust direction, when the photograph direction

15   manipulation key is not selected, and the multichannel image driver displays the mark after moving

16   the mark in the direction display window in accordance with a dragging direction of a mouse clicked

17   to select the mark, outputs a rotation control signal through the multichannel image processor to the

18   photographing apparatus in order to rotate the photographing apparatus according to the moving

19   direction, and displays the mark to be returned the initial point when the click is released.

20   The next menu key for selecting to see a succeeding frame for offering a detailed photograph

21   key capable of adjusting and setting up a detailed function including a photographing pattern of the

1   photographing apparatus, is provided on the manipulation key window, and when the next menu key

2   is selected, the multichannel image driver loads and displays the succeeding frame on the display

3   device and processes a function corresponding to the selected detailed photograph key.

4   The detailed photograph key includes menu keys capable of selecting and setting up an

5   identifier for each camera, a white balance, a setter speed, and motion detection. More preferably

6   the detailed photograph key comprises: a preset key for selecting a mode that the photographing

7   apparatus operates according to a set-up information with respect to a region corresponding to one

8   of ordered numbers among the ordered number of a preset set-up information, the preset set-up

9   information which has been classified selectively by assigning the ordered numbers to respective

10   detailed regions thereof according to an azimuth angle; a manipulation pattern operation key for

11   operating the photographing apparatus in accordance with stored information about the manipulation

12   of the basic photograph direction manipulation key manipulated by a user; and a scan key for

13   operating the photographing apparatuses to consecutively photograph so as to correspond to the

14   preset set-up information in accordance with the ordered number.

15   The detailed photograph manipulation key comprises: an auto pan key for driving a pan

16   within a set-up pan angle; and a block set-up key for setting up an object of which movement with

17   respect to an image information displayed on the image display window is to be detected, by

18   appointing a block for some region in the image display window.

19   Moreover, a memory capacity display window is disposed at a side of the main frame in order

20   to display a memory capacity, wherein the multichannel image driver calculates remaining memory

21   capacity of the user's computer and displays the remaining memory capacity through the memory

1   capacity display window.

2   A system set-up key is disposed on the manipulation key window. The multichannel image

3   driver loads a set-up module window for supporting to set up a system when the system set-up key

4   is selected on the display device. The set-up module window includes a window capable of selecting

5   a directory for storing the received image in a memory of the user's computer, and an alarm capacity

6   selection window capable of setting up a remaining capacity alarm target value to generate an alarm

7   signal when a remaining memory capacity of the memory reaches a set-up value.

8   A separation key is disposed in the main frame in order to load a separated image window

9   for displaying a transmitted image separated from the main image window. The multichannel image

10   driver displays an image corresponding to a display mode by loading a separated image window

11   when the separation key is selected, and displays after adjusting a size of the separated image

12   window and the image corresponding to the received signal when a signal for manipulating the size

13   of the separated image window through an input device is received.

14   It is preferable that the user's computer includes the multichannel image driver and a window

15   operating system for supporting a multi-tasking for operating an application program stored in a

16   memory, and the multichannel image driver is operated being supported by the window operating

17   system.

18   To achieve these and other objects in accordance with the principles of the present invention,

19   as embodied and broadly described, the present invention provides a security system, comprising:

20   a multichannel image processor selectively receiving image signals transmitted through a plurality

21   of input channels and outputting the image signals; and a computer being connected with said

1 multichannel image processor through a communication interface, said computer having a

2 multichannel image driver, said computer inputting the image signals outputted from said

3 multichannel image processor; the multichannel image driver controlling a selection of at least one

4 of the input channels in accordance with a selected set-up mode, supplying a main image display

5 window displaying the inputted image signals to a main frame of a display device, supplying at least

6 one manipulation key window displaying keys to the main frame of the display device, processing

7 in accordance with the selected set-up mode, performing at least one selected from among displaying

8 the inputted image signals through the display device in accordance with the selected set-up mode

9 and recording the inputted image signals in a memory in accordance with the selected set-up mode,

10 the displayed keys being for selecting the selected set-up mode and other modes, the main image

11 display window and the at least one manipulation key window being integrally displayed on the main

12 frame of the display device.

13 To achieve these and other objects in accordance with the principles of the present invention,

14 as embodied and broadly described, the present invention provides a multichannel image processor,

15 comprising: a plurality of input channels receiving image signals transmitted from a plurality of

16 cameras; a plurality of memories storing the image signals received by said plurality of input

17 channels; a memory controller selectively outputting the image signals stored in said plurality of

18 memories, in accordance with a control signal; a coding unit coding signals output from said

19 plurality of memories and transmitting the coded signals through an image output terminal for a

20 computer; and a main controller controlling said memory controller in accordance with the control

21 signal, the control signal being transmitted from the computer through a computer data

1   communication terminal.

2   To achieve these and other objects in accordance with the principles of the present invention,

3   as embodied and broadly described, the present invention provides an apparatus installed in a

4   computer, comprising: a receiver being disposed in the computer to receive signals transmitted to

5   the computer from an external device; and a multichannel image driver outputting a channel

6   selection signal to the external device through a set-up port according to a set-up mode, displaying

7   the signals input through said receiver on a display device, recording the signals input through said

8   receiver in a memory in accordance with the set-up mode, displaying a main image display window,

9   the main image display window displaying together on a main frame the signals input through said

10   receiver and a manipulation key window displaying keys for selecting a mode, and processing in

11   accordance with a selected key, the selected key being one of the keys displayed by the manipulation

12   key window.

13   To achieve these and other objects in accordance with the principles of the present invention,

14   as embodied and broadly described, the present invention provides a computer storage medium

15   having stored thereon a set of instructions implementing a method, said set of instructions

16   comprising one or more instructions for:selectively receiving image signals transmitted through a

17   plurality of input channels and outputting the image signals; and controlling a selection of at least

18   one of the input channels in accordance with a selected set-up mode, displaying the outputted image

19   signals in a main image display window of a display device of a computer in accordance with the

20   selected set-up mode, displaying signals stored in a memory, supplying at least one manipulation key

21   window displaying keys for selecting the set-up mode and other modes, controlling said selective

1   receiving of the image signals in accordance with the selected set-up mode, the main image display

2   window and the manipulation key window being integrally displayed on a main frame of the display

3   device.

4   The present invention is more specifically described in the following paragraphs by reference

5   to the drawings attached only by way of example. Other advantages and features will become

6   apparent from the following description and from the claims.

BRIEF DESCRIPTION OF THE DRAWINGS

In the accompanying drawings, which are incorporated in and constitute a part of this

specification, embodiments of the invention are illustrated, which, together with a general

10   description of the invention given above, and the detailed description given below, serve to

11   exemplify the principles of this invention.

12   FIG. 1 is a view showing a security system employing a switching unit;

13   FIG. 2 is a view showing a security system employing a multichannel image processor, in

14   accordance with the principles of the present invention;

15   FIG. 3 is a block diagram showing one preferred embodiment of a multichannel image

16   processor of FIG.2;

17   FIG. 4 is a block diagram showing another preferred embodiment of a multichannel image

18   processor of FIG. 2;

19   FIG. 5 is a block diagram showing the user's computer of FIG. 2;

20   FIG. 6 is a block diagram showing a multichannel image driver of FIG. 5;

1 FIG. 7 is a view showing a main frame displayed by a multichannel image driver of FIG. 6

2 through a display device;

3 FIG. 8 is a view showing a set-up module window offered by being loaded when a system

4 set-up key of FIG. 7 is selected;

5 FIG. 9 is a view showing a succeeding frame offered when a next key of FIG. 7 is selected;

6 FIG. 10 is a view showing a size variable separated image display window offered when a

7 separation key of FIGS. 7-9 is selected;

8 FIG. 11 is a view showing a module offered by being loaded when an open key of FIG. 7 is

9 selected;

10 FIG. 12A is a view showing a memory capacity consumed when image data is recorded into

11 a record device using National Television Standards Committee (NTSC) method by a multichannel

12 image driver of FIG. 6 for a transmitted image; and

13 FIG. 12B is a view showing the memory capacity consumed by time when image data is

14 recorded into a record device using phase alternating line (PAL) method by the multichannel image

15 driver of FIG. 6 for the transmitted image.

16   **DETAILED DESCRIPTION OF PREFERRED EMBODIMENT**

17 While the present invention will be described more fully hereinafter with reference to the

18 accompanying drawings, in which a preferred embodiment of the present invention is shown, it is

19 to be understood at the outset of the description which follows that persons of skill in the appropriate

1   arts may modify the invention here described while still achieving the favorable results of this

2   invention. Accordingly, the description which follows is to be understood as being a broad, teaching

3   disclosure directed to persons of skill in the appropriate arts, and not as limiting upon the present

4   invention.

5   Illustrative embodiments of the invention are described below. In the interest of clarity, not

6   all features of an actual implementation are described. It will be appreciated that in the development

7   of any actual embodiment numerous implementation-specific decisions must be made to achieve the

    developers' specific goals, such as compliance with system-related and business-related constraints,

    which will vary from one implementation to another. Moreover, it will be appreciated that such a

10 development effort might be complex and time-consuming, but would nevertheless be a routine

11 undertaking for those of ordinary skill having the benefit of this disclosure. Additionally, the

12 embodiments disclosed can be combined, in accordance with the principles of the present invention,

13 to form an embodiment that enhances the benefits of the present invention.

14 FIG. 1 is a view showing a security system employing a switching unit. Referring to FIG.

15 1, the security system employing the switching unit comprises a plurality of security cameras 11, a

16 switching unit 12, a monitor 13, and a recorder / reproducer 14.

17 The switching unit 12 selectively receives image signals transmitted from the plurality of

18 security cameras 11 in accordance with a sequence of set up, and outputs the image signals. The

19 monitor 13 displays the image signals transmitted from the switching unit 12, and the recorder /

20 reproducer 14 records the images received through the switching unit 13 into a recording medium.

21 The recorder / reproducer 14 has a plurality of keys to set up recording and playing the images

1   recorded in the recording medium.

2   This security system employing the switching unit is established by contacting the switching

3   unit 12 and the recorder / reproducer 14 which are exclusively used for the security system

4   employing the switching unit to the monitor 13 and the security cameras 11. However, each product

5   is expensive because they are supplied to be exclusively used only for the security system. Thus,

6   only some users, who have a greater need to watch and secure the building that justifies the expenses

7   for installing the system, purchase the security system. Consequently, it is difficult to lower the cost

8   needed to establish the security system employing the switching unit, and the cost has become an

9   obstacle to obtain a plentiful supply of users.

10   Most office-working environments have been changed to use computers for accomplishing

11   jobs, and also the use of computers, which enable Internet communication at home, has been widely

12   increased. Yet, if the monitor 13 and the recorder / reproducer 14 among the security systems are

13   installed in a working place with the electric devices, the practical usage rate is deteriorated, since

14   some places for installing the devices should be allocated there. Moreover, when using other

15   devices, the devices might have to be moved to change their positions.

16   Hereinbelow, the preferred embodiment of the present invention will be described in great

17   detail by referring to the appended drawings. FIG. 2 is a view schematically showing a security

18   system employing a multichannel image processor, in accordance with the principles of the present

19   invention.

20   Referring to FIG. 2, the security system includes a multichannel image processor 30 and a

21   user's computer 50. The computer 50 includes monitor 54, keyboard 55b, and mouse 55a. The

1 multichannel image processor 30 is connected between a plurality of cameras 20 for photographing

2 and the user's computer 50.

3 The multichannel image processor 30 selectively processes signals transmitted from the

4 plurality of cameras 20 in accordance with a control signal transmitted from the user's computer 50,

5 transmits the processed signals to the users' computer 50, and controls driving of the plurality of

6 cameras 20. Preferably, the multichannel image processor 30 is one piece to be installed outside.

7 Moreover, it is preferable that the multichannel image processor 30 has separated input

8 channels for receiving input signals and channels for communicating data to control the plurality of

9 cameras 20 in regard to the plurality of cameras 20. A wireless communication or a communication

10 by wire can be used for the data communication, and it is preferable that the data communication by

11 wire applies an RS-485 interface mode, which has a little decay rate for a long distance.

12 A more detailed description will be done hereinafter by referring to FIG. 3. The FIG. 3 is a

13 block diagram showing one preferred embodiment of the multichannel image processor of FIG. 2,

14 according to the present invention. Referring to FIG. 3, the multichannel image processor 30a has

15 an input channel port 31, a plurality of analog-to-digital (A/D) converters 33, a coding unit 37, a

16 central processing unit (CPU) main controller 39, a memory controller 41, an RS-232 interface (I/F)

17 module 43, and an RS-485 interface (I/F) module 44.

18 The input channel port 31 has a plurality of input channels 31a1, 31b1, 31c1, and 31d1

19 disposed therein in order to receive signals transmitted from the plurality of cameras 20a, 20b, 20c

20 and 20d.

21 Preferably, each input channel (IN) 31a1, 31b1, 31c1, and 31d1 have output terminals (OUT)

1   31a2, 31b2, 31c2, and 31d2, which are branched off from the input channels 31a1, 31b1, 31c1, and

2   31d1 to output the image signals transmitted from the cameras 20 as signals for separate apparatuses

3   by branching off the signals. Numbers Ch1 through Ch4 is given for more convenient description

4   for image output line of each camera 20a, 20b, 20c, and 20d.

5   Only four input channels 31a1, 31b1, 31c1, and 31d1 are shown to avoid the complication

6   of the figure, but the number of input channels can be extended. The A/D converters 33a, 33b, 33c,

7   and 33d are disposed for each input channel 31a1, 31b1, 31c1, and 31d1, and convert transmitted

8   analog signals into digital signals. The A/D converters 33 can be omitted, when the multichannel

9   image processor 30a supports a digital camera.

10   The memory 35 temporarily stores the image signals transmitted from the input channels

11   disposed corresponding to each input channel 31a1, 31b1, 31c1, and 31d1. The memory 35 can be

12   called a frame buffer.

13   The memory controller 41 selectively controls the memory 35 in accordance with a channel

14   control signal, and outputs the memory to the coding unit 37. In other words, if it is a four-division

15   display mode, the memory controller 41 controls the memory 35 so that the data transmitted to the

16   memory 35 of each channel can be consecutively output for each frame, and if it is a single mode,

17   the memory controller 41 controls the memory 35 to continuously output only the data transmitted

18   to the memory 35 of selected channels.

19   The coding unit 37 encodes the image signals output from the selected memory 35, and

20   outputs the coded signals through a video 2-output port 47, which is an image output terminal for

21   the user's computer 50. The encoding method of the coding unit 37 can apply various methods, for

1 example, it can be a method of separating the data for colors and encoding the data.

2 A multiplexer 45 disposed between the each input channel 31a1, 31b1, 31c1, and 31d1 and

3 video 1-output port 46 in order to consecutively switch the input channel 31a1, 31b1, 31c1, and 31d1

4 in accordance with a set-up order. Here, the video 1-output port 46 is a terminal for transmitting an

5 image generated by being switched in turn for the channels by the multiplexer 45 to another external

6 apparatus or displayer (not shown) different from the user's computer 50. Therefore, the video 1-

7 output port 46 can be used when the user wants to divide the image transmitted from the plurality

8 of cameras 20 into four on a screen of the display device in a working circumstance different from

9 the user's computer 50.

10 An alarm sensor 60 can use each kind of sensors known as sensors for sensing an abnormality

11 in the region of the object to be watched of the cameras 20. For example, a contacting or non-

12 contacting sensor for sensing the opening/closing of a door, a heat sensor using heat sensing method

13 for sensing the entrance of a person, a motion sensor detecting motion of a person, and a piezo-

14 electric sensor for sensing the damage or shock by being attached on a window can be applied as the

15 alarm sensor 60. In addition, an infrared sensor, a magnetic sensor, etc. can be applied as the alarm

16 sensor 60 according to the attribute of the object being watched.

17 A user can utilize the present invention to designate (or select) one or more cameras to be

18 associated with a particular alarm sensor. Then, when that particular alarm sensor is activated, video

19 images from the designated camera or cameras can be automatically recorded and displayed. The

20 locations of the designated cameras is independent of the location of the alarm sensor. Thus, the

21 designated cameras can be physically near the region of the alarm sensor, or the designated cameras

1   can be physically distant from the region of the alarm sensor.

2   For example, if a first alarm sensor is set to detect when an important door opens, a user can

3   select three cameras to be associated with an alarm signal from that first alarm sensor. The three

4   cameras could include a first camera positioned to allow a user to view a front side of the important

5   door, a second camera positioned to allow the user to view a back side of the important door, and

6   a third camera positioned to allow the user to view any people who travel down a hallway that is near

7   a room with valuable items, and the hallway is 100 meters from the important door. In response to

8   the alarm signal from the first alarm sensor, image signals from those three cameras can be

9   sequentially recorded, or displayed, or recorded and displayed, for a predetermined amount of time.

10   Generally, in accordance with the principles of the present invention, one alarm sensor is

11   used for one camera, and thus one alarm sensor is associated with one and only one camera.

12   However, as in the example described above, multiple cameras can be designated to be associated

13   with a single sensor, in accordance with the principles of the present invention. Thus, the present

14   invention can be set up to have five cameras (numbered 1 through 5) and ten alarm sensors

15   (numbered 1 through 10), for example. Here, the camera number 2, the camera number 4, and the

16   camera number 5 can be set to correspond to the alarm sensor 7, for example. When the alarm

17   sensor 7 is activated, the images viewed by cameras 2, 4, and 5 can be sequentially displayed and

18   recorded in the following order: camera 2 -> camera 4 -> camera 5 -> camera 2 -> camera 4 ->

19   camera 5 -> camera 2 -> camera 4 and so on.

20   If an abnormality signal is transmitted from the alarm sensor 60, the main controller 39

21   transmits the abnormality signal receive information to the user's computer 50, and controls the

1   memory controller 41 so that a channel can be selected corresponding to an alarm channel select

2   mode replied from the user's computer 50 for the generation of the abnormality signal.

3   The RS-232 interface module 43 communicates data between the main controller 39 and the

4   user's computer 50, and comprises a computer data communication terminal for connecting. The

5   RS-485 interface module 44 supports data communication for controlling the operation of the

6   cameras 20 connected with the main controller 39 through the input channels 31a1, 31b1, 31c1, and

7   31d1. The RS-485 interface module 44 has a camera communication terminal.

8   A reference numeral 42 is an electrically erasable programmable read only memory

9   (EEPROM) having various data including a starting program. The cameras 20 comprise an interface

10   module 24, a camera controller 21, a camera drive unit 22, and a photograph unit 23.

11   The photograph unit 23 converts the signals photographed through a lens into electric image

12   signals, and transmits the electric image signals to one input channel selected among the plurality

13   of input channels 31a1, 31b1, 31c1, and 31d1 through the camera controller 21.

14   The camera drive unit 22 can drive the photograph unit 23 corresponding to supported

15   functions such as pan, tilt, and zoom in/out, and controls the driving of the photograph unit 23

16   according to a control signal input from the RS-485 interface module 44 through the camera

17   controller 21. In the preferred embodiment of the present invention, to avoid the complication of

18   the figure, it has been illustrated that one camera 20 is connected with the RS-485 interface module

19   44, but a plurality of cameras 20 can be connected in parallel with the RS-485 interface module 44,

20   and the communication with the set-up cameras 20 is performed by using an identifier set up

21   differently for each camera.

1   When a camera can zoom in/out, this indicates that the camera can zoom in and can zoom

2   out. A zoom operation can include a zoom-in function or a zoom-out function, or one of those two

3   functions followed by the other. When a camera performs a zoom in/out, the camera can be said to

4   be performing a zoom operation.

5   The cameras 20 communicate data through the RS-485 interface module 44, and the

6   photographed image signals are transmitted to the input channels 31 through a separate output

7   terminal.

8   On the other hand, the multichannel image processor 30 can be constructed to perform

9   wireless communication with the cameras 20 unlike the communication method by wire such as the

10 RS-485 interface module 44.

11   FIG. 4 is a block diagram showing another preferred embodiment of the multichannel image

12 processor of FIG. 2, according to the present invention. The elements having the same functions as

13 the elements shown in FIG. 3 are given the same reference numerals.

14   The multichannel image processor 30b comprises a wireless transmitter 49 for

15 communicating data between the main controller 39 and the cameras 20. Moreover, the cameras

16 20 also have a wireless transmitter 25. According to the above construction, the multichannel image

17 processor 30b can wirelessly control the movement of the cameras 20. A different embodiment of

18 the image processor of FIG. 2 has the wireless capabilities of FIG. 4 and also the non-wireless

19 capabilities of FIG. 3. The user's computer 50 is established with the usual computer hardware.

20   FIG. 5 is a block diagram showing the user's computer 50 of FIG. 2 in more detail. Referring

21 to FIG. 5, the user's computer 50 has a central processing unit (CPU) 51, a read only memory (ROM)

1   52, a random access memory (RAM) 53, a display device 54, an input device 55, a memory 56, and

2   a communication device 58.

3   The input device 55 includes a mouse 55a and/or a keyboard 55b. The communication

4   device 58 includes an RS-232 interface module (not shown) for a serial communication.

5   An image signal input end (not shown) of the user's computer 50 receives image signals from

6   the video 2 output port 47 of the multichannel image processor 30. It is preferable that a video

7   graphic adaptor (VGA) card (not shown) be used for processing those image signals.

8   An operating system (O/S) 57, for supporting a window system such as window 98, window

9   2000, and linux, is disposed in the memory 56. A multichannel image driver 70, which is an

10   application program for an image security is installed in the memory 56.

11   The multichannel image driver 70 is programmed to process the signals transmitted from the

12   plurality of cameras 20 by being supported from the operating system 57, and control the

13   multichannel image processor 30 and the cameras 20 in a window system. The multichannel image

14   driver 70 can be offered in a form recorded in a recording medium, so that the multichannel image

15   driver 70 can be installed in a desired user's computer.

16   The computer 50 uses a windows-based operating system. Some examples of windows-

17   based operating systems include Microsoft Windows 95, 98, ME, NT, 2000, and XP. However, this

18   invention is not limited to computers using Microsoft operating systems. There are windows-based

19   operating systems other than Microsoft Windows operating systems. For example, Apple Computer

20   has utilized a windows-based operating system for Apple's Macintosh computer.

21   FIG. 6 is a block diagram showing a multichannel image driver of FIG. 5. As shown in FIG.

1 6, the multichannel image driver 70 comprises a transmitter 71, a controller 72, a display unit 73, and

2 a module support unit 74. The transmitter 71 receives the signals transmitted from the multichannel

3 image processor 30 through the communication device 58, transmits the signals to be transmitted

4 from the controller 72 to the multichannel image processor 30 through the communication unit 58.

5 The module support unit 74 comprises various operation modules for offering a main frame

6 when the multichannel image driver is operated and screens loaded corresponding to the selected

7 key, and performing a function corresponding to an offered menu by being controlled by the

8 controller 72. There are a system set-up window, a main frame, a succeeding frame, a separated

9 image display window, a recorded memory capacity/remaining memory capacity calculate module

10 of the memory 56, and recordable time calculate module as examples of the operation modules, and

11 the above-mentioned modules are described later on. The display unit 73 displays information about

12 an object to be displayed through the display device 54 by being controlled by the controller 72.

13 Hereinafter, the operation of the multichannel image driver 70 will be described in greater

14 detail by using a screen offered when the multichannel image driver 70 is operated.

15 FIG. 7 is a view showing a main frame displayed by a multichannel image driver of FIG. 6

16 through a display device. The main frame is offered through the display device when the

17 multichannel image driver is operated. Referring to FIG. 7, the main frame 80 is displayed on a

18 screen 54a of the display device 54. The main frame 80 comprises a main image display window

19 81, and a manipulation window having a plurality of keys displayed in regions plurally divided.

20 The main image display window 81 is a window for displaying transmitted image

21 information as four-divided screen or as one screen in accordance with a display mode. The

1 manipulation window comprises a first key box 100 disposed at a lower end, and a second key box

2 110 disposed at a right side. The keys in the key boxes 100 and 110 are used to select features of

3 the security system.

4 A power key 101, disposed at the first key box 100, is used when unloading the screen, which

5 means finishing the operation. The power key 101 is a key for performing the same function as the

6 close button illustrated at reference numeral 85, which is a familiar feature in the window system.

7 A stop key (STOP), a record key (REC), a rewind key (REW), a play key (PLAY), a fast

8 forward key (F.F), and a pause key (PAUSE) are all well-known keys, and the description about the

9 function of these keys will be omitted. The features associated with these keys are well known.

10 An open key (OPEN) 103 is a key to be used when reproducing a recorded file. When the

11 open key 103 is selected, the controller 72 controls the module support unit 74 so that the desired

12 file is easily selected, and loads a file select support window 303 as shown in FIG. 11. FIG. 11 is

13 a view showing a module offered by being loaded when an open key of FIG. 7 is selected. The file

14 select support window 303 offers a condition select menu 305, and a record file list display window

15 307 for listing up the recorded files in accordance with a selecting condition.

16 The condition select menu 305 includes a menu for selecting the type of the recorded image

17 file (an alarm record, a user record, and a camera number select window), and a menu for setting a

18 date section of the image file that the user wants to find. Here, the alarm record is an image file

19 recorded when the alarm mode is operated, and the user record is an image file recorded when the

20 user pushes a record key. The camera number select window is a window to be used when looking

21 up recorded files only corresponding to the entered camera number.

1   A look-up key 306 searches files corresponding to the selected menu from the memory 56,

2   and lists the searched files. The record file list display window 307 has a window for supporting

3   search of a folder, and a window for listing up the recorded file according to the selected condition.

4   Preferably, the list offers information on the files corresponding to listed items such as a record date,

5   a record mode (an alarm mode and a user mode), a camera number, a fps (frame per second) value,

6   and a file name. The file name is automatically created when the user pushes the record key, or

7   when recording for a predetermined time is automatically performed by being judged by the alarm

8   mode. Preferably, the file name is named so that the user easily recognizes recording information,

9   for example, the record date, the camera number, the record mode, and a coding method, etc.,

10   through the file name. For example, if an image of a camera number 5 recorded 2001 July 4th p.m.

11   1 o'clock 47 minutes 14 seconds is a file of the first screen recorded as a Joint Photographic Experts

12   Group (JPEG) method as the user selects the record key, the controller 72 creates the file name as

13   20010704134714_CAM05_user_01.MJPEG. In the above file name, for a file name recorded by

14   the alarm mode, the part addressed as user is replaced by alarm, which shows that the file is recorded

15   by the alarm mode.

16   According to the above method for creating, naming, and supporting to read files of the

17   multichannel image driver 70, the user can find an image that he/she wants to see without any

18   difficulty, and the time for searching files will be decreased.

19   Referring back to FIG. 7, the second key box 110 has a window for inputting the number of

20   a camera, and a key (SEL) for selecting when the user wants to see the image of the camera

21   corresponding to the input camera number. If the SEL key is selected, the multichannel image driver

1 70 processes the image transmitted from the camera of the input number to be displayed on the main

2 image display window as a full screen. Reference numeral 111 is a system set-up key.

3 FIG. 8 is a view showing a set-up module window offered by being loaded when a system

4 set-up key of FIG. 7 is selected. FIG. 8 is a view showing a system set-up module window, which

5 is loaded by being supported by the module support unit 74, when the system set-up key 111 is

6 selected. As shown in FIG. 8, the system module set-up window 211 offers menus for selecting a

7 communication set-up 220, a camera set-up 230, an alarm set-up 240, and a video set-up 250. The

8 window 211 is displayed when the set-up mode is selected or requested. The set-up mode is selected

9 or requested when the set-up key 111 is selected.

10 The communication set-up menu 220 offers a menu for setting up a port to communicate with

11 the multichannel image processor 30. The camera set-up menu 230 offers a menu for setting up one

12 number in the range from 0 to 255 of the plurality of cameras 20 connected with the input channels

13 of the multichannel image processor 30. The camera set-up menu 230 offers also a menu for setting

14 up a sequence maintenance time for each channel adjustable in one-second increments, from one

15 second to 30 seconds. The range of numbering the cameras and selecting the sequence maintenance

16 time is not limited to the above-mentioned preferred embodiment.

17 The alarm set-up menu 240 offers a menu for setting up an alarm mode operation time to

18 consecutively record and display on the corresponding cameras 20, when an alarm signal is

19 transmitted from the multichannel image processor 30.

20 The video set-up menu 250 offers a menu for setting up a directory to record the image

21 displayed through the image display window 80, and a disk limit alarm item for setting up to alarm

1 when the remaining capacity of the memory 56 reaches a certain percent of the entire capacity. The

2 video set-up menu 250 also offers a menu for stopping the recording, when the memory capacity

3 reaches the set-up aimed capacity set through the disk limitation item, or for compressing and storing

4 the image with set-up coding method, for example, JPEG, wavelit, or Moving Picture Experts Group

5 (MPEG).

6 For one example, the memory capacity, consumed by time in accordance with the number

7 of frame per second and the attribute of the image data in regard to the degree of the movement, a

8 National Television Standards Committee (NTSC) method and a phase alternating line (PAL)

9 method are shown in FIG. 12A and FIG. 12B, when the coding method for the record is set up as the

10 motion JPEG coding method. FIG. 12A is a view showing a memory capacity consumed when

11 image data is recorded into a record device using National Television Standards Committee (NTSC)

12 method by a multichannel image driver of FIG. 6 for a transmitted image. FIG. 12B is a view

13 showing the memory capacity consumed by time when image data is recorded into a record device

14 using phase alternating line (PAL) method by the multichannel image driver of FIG. 6 for the

15 transmitted image.

16 The recordable time is for the remaining capacity in the entire capacity of the memory 56 can

17 be calculated by setting up a basic data for the memory capacity per frame based on the basic data.

18 In addition, the video set-up menu 250 has a window for setting up a frame capture rate per

19 second and for displaying a recordable time in the memory 56 when applying the present record rate,

20 and for setting up the storing date of the recorded files.

21 Referring back to FIG. 7, if one key among four camera select keys located next to the system

1 set-up key 111 is selected, the selected key processes the display mode for displaying the image of

2 only the corresponding camera 20. Reference numeral 116 is a key for dividing the image display

3 window 81 into four and displaying the image transmitted from four cameras 20 after dividing the

4 image into four. Reference numeral 117 is a key for consecutively displaying the image signals as

5 a full screen on the image display window 81 for the order of the cameras corresponding to the set-

6 up pattern. Reference numerals 118 through 121 are keys for setting up a mode for displaying the

7 image after freezing the image of the corresponding cameras in the four-divided display mode. In

8 other words, if the reference numeral 119 is selected, the images of the camera numbers 1, 3, and 4

9 are consecutively displayed in regard to the transmission to the divided regions corresponding to the

10 four-divided screens, and, in the image displaying region for the camera number 2 among the four-

11 divided screens, the present image of the camera number 2 is frozen and continuously displayed.

12 Reference numeral 122 is a key for using when lifting the alarm mode operated in accordance with

13 the transmission of the alarm signal.

14 Reference numeral 130 is an azimuth marking window, and there is azimuth guide

15 information such as up, down, right, and left displayed therein for guiding the photograph adjust

16 direction based on a round point in the center.

17 A ball mark 131 indicated as a ball type at the round point in the azimuth mark window 130

18 is a photograph direction manipulation key, and if the key is not selected, the ball mark 131 is placed

19 at the round point.

20 The multichannel image driver 70 displays the ball mark 131 in the azimuth mark window

21 130 by moving the ball mark 131 in accordance with the drag direction of the mouse 55a clicked to

1   select the ball mark 131, and outputs a rotation control signal including a corresponding movement

2   coordinate information for rotating a corresponding camera (selected by a key among the camera

3   select keys such as 112 through 115 and the SEL key) in accordance with the direction of the

4   movement to the corresponding camera 20 through the multichannel image processor 30.

5   When the click status of the mouse 55a is released, the ball mark 131 is returned to the round

6   point. Therefore, the user can easily adjust the photograph direction of the cameras 20 by

7   manipulating the mouse 55a. The ball mark 131 can be selected by placing the arrow associated with

8   computer mouse 55a over the ball mark 131, and then pressing down the left mouse button 55c.

9   Then, the ball mark 131 can be moved in the azimuth marking window 130 in a desired direction

10   by moving the mouse 55a in a corresponding direction, with the left mouse button 55c continuously

11   held down. Thus, the ball mark 131 is dragged in the desired direction. In this way, a camera's

12   viewing direction can be easily modified. When the left mouse button 55c is released, the camera

13   stops moving, and the ball mark 131 returns to the center of the azimuth marking window 130.

14   Keys disposed next to the names of focus, zoom, and iris are basic photograph manipulation

15   keys, and these keys are for adjusting the focus, zoom, and iris as understood through the contents

16   (such as far, near, wide, tele, open, and close) written under these keys.

17   The window associated with reference numeral 140 is a scale bar display window for

18   displaying recorded capacity of the memory 56. The window associated with reference numeral 150

19   displays remaining memory capacity of the memory 56 and recordable time when recoding with the

20   currently set-up record mode.

21   On the other hand, when the key associated with reference numeral 107 is selected, a

1 succeeding frame is presented, as shown in FIG. 9. The key associated with reference numeral 107

2 is the next key 107. The FIG. 9 is a view showing a succeeding frame offered when a next key 107

3 of FIG. 7 is selected. The elements having the same functions as the previous figures have been

4 numbered as the same reference numerals.

5 In FIG. 9, the first key box 100 is replaced by a third key box 260, and the rest of the

6 elements are the same as those in the previous figures. The third key box 260 has a plurality of

7 detailed photograph manipulation keys. The keys in the key box 260 are used to select features of

the security system.

Let us suppose that main frame 80 and first key box 100 are displayed, as shown in FIG. 7.

In this circumstance, if the "next" key 107 is selected, then main frame 80 is replaced by succeeding

frame 180, and also first key box 100 is replaced by third key box 260 (as shown in FIG. 9).

If the next key 107 is pressed (selected) in a state when the frame 80 is being displayed, the

frame 80 will no longer be displayed, and the frame 180 shall then be displayed. Likewise, if the

14 next key 107 is selected in a state when the frame 180 is displayed, the frame 180 will no longer be

15 displayed, and the frame 80 shall be displayed.

16 The third key box 260 is displayed in FIG. 9. The third key box 260 includes the menu key

17 261, the preset key 262, the pattern key 263, and other keys.

18 When a user selects the menu key 261 in the third key box 260, the screens that are loaded

19 are: a screen for setting conditions about white balance, shutter speed, and motion detection function;

20 a screen for setting a range of angle of auto pan; a screen allowing a user to give numbers to each

21 of the regions divided in regard to the 360° of the azimuth angle and setting zoom in/out according

1   to the numbers given to the regions (thus setting information required for execution of preset key 262

2   and scan key 264); and a screen for setting conditions corresponding to the execution of the sub-

3   menu key.

4   When a user selects the preset key 262 in the third key box 260, there is no additional screen

5   displayed. The number of the camera that wants the preset mode and the zoom in/out preset set-up

6   number corresponding to a desired azimuth angle are selected after selecting the preset key 262.

7   Then, by selecting an enter key, photographing is carried out according to the zoom in/out

8   information set at the azimuth angle that corresponds to the selected preset set-up number.

9   When a user selects the pattern key 263 in the third key box 260, there is no additional screen

10   displayed. The file name of a file corresponding to a desired operation pattern (selected from among

11   stored patterns) is typed into the computer after selecting the pattern key 263. Then, by selecting the

12   enter key, photographing is carried out according to the operation pattern that corresponds to that file

13   name.

14   The user selects pattern information storage items from a setting screen that is provided

15   through the manipulation of the menu key 261. While adjusting the camera through the basic

16   manipulation keys, the adjustment information about the operational pattern of the camera is stored

17   for a predetermined time period (30 seconds, for example). At the time of the storage, each item of

18   the operational pattern information as stored is given a name that will identify the same from

19   another. The user, therefore, uses the pattern key 263 when he/she wants to view the image that is

20   taken by the camera repeatedly operated according to a certain one of the stored operational patterns.

21   As shown in FIGS. 7 and 9 of one preferred embodiment of the present invention, the keys

1   in the second key box 110 are included in the main frame 80 and the next frame 180, the keys in the

2   first key box 100 are included in the main frame 80, and the keys in the third key box 260 are

3   included in the next frame 180. However, a window can also be designed such that the keys in the

4   first, second, and third key boxes 100, 110, and 260 are all included in one frame, although the

5   screen would become more complex.

6   If a menu key 261 is clicked, the menu key 261 supports to set up in advance what is needed

7   to operate the functions of the detailed photograph manipulation keys that will be described later on.

8   Preferably, the menu key 261 supports to select and set up an identifier for each camera, white

9   balance, shutter speed, and motion detection. If the menu key 261 is selected, a corresponding

10   module program of the module support unit 74 is loaded.

11   The set-up item supported by the menu key 261 is being corresponded to the operation key,

12   which will be described later on, and the set-up support will be explained using a key also described

13   later on.

14   A preset key 262 is a key for selecting a mode for a photographing operation, in accordance

15   with preset set-up zoom in/out information. The preset set-up zoom in/out information is used by

16   the photographing apparatus in order to photograph the region corresponding to one ordered number

17   among the zoom in/out preset set-up information, which is set up after being selectively divided by

18   giving numbers to each region plurally divided in regard to the azimuth angle. The preset set-up

19   information can set up zoom in/out about the 128 regions plurally divided in regard to the azimuth

20   angle by using the menu key 261 and a corresponding zoom in/out key. The set-up zoom in/out

21   information can be described as set-up zoom information. The preset set-up zoom in/out information

1   can be described as preset set-up zoom information.

2   If the user wants the camera to photograph with one preset set-up number among the preset

3   set-up information, the user selects the preset key 262, and then inputs the preset set-up number into

4   a number input window below, and clicks an enter key (an arrow is indicated in a box) disposed

5   beside, then the camera is controlled to photograph in the set up zoom in/out status in regard to the

6   azimuth angle of the corresponding number.

7   A manipulation pattern key 263 is a key for operating the camera in accordance with a stored

8   pattern for a certain manipulation of the basic photograph direction manipulation key. Here, if a

9   pattern memory is set up using the menu key 261, the manipulation pattern memory stores the pattern

10   information about the manipulation of the basic photograph direction manipulation key for a

11   predetermined time, 30 seconds. Preferably, whenever storing the manipulation pattern, the menu

12   key 261 supports to give an identification number. In this case, as described before, after the

13   manipulation pattern operation key 263 is selected, if an identification number of a desired

14   manipulation pattern is entered, and the enter key is clicked, the camera is controlled to be operated

15   in accordance with the stored manipulation pattern.

16   A scan key 264 is a key for commanding to sequentially photograph regions corresponding

17   to the preset set-up information, according to ordered numbers, by using the menu key 261. In other

18   words, when the preset ordered numbers are set up from 0 to 5, if the scan key 264 is selected, then

19   the scan key 264 controls the camera to photograph the regions corresponding to the ordered

20   numbers from 0 to 5 sequentially by adjusting the zoom in accordance with the corresponding zoom

21   information. The zoom information can be described as preset zoom in/out set-up information.

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1   Each one of the ordered numbers corresponds to a region that can be photographed or viewed

2   by at least one of the cameras. Thus, when the present invention is directed to sequentially

3   photograph or view regions corresponding to ordered numbers 0 to 5, the following steps occur.

4   First the region 0 is photographed/viewed, then region 1 is photographed/viewed, then region 2, then

5   region 3, then region 4, etc.

6   An auto pan key 265 is a key for consecutively operating pan drive in the region of an auto

7   pan angle set up by using the menu key 261. For example, if the auto pan key 265 is clicked, when

8   the auto pan angle is set up for 0 to 90 degree, then the pan drive is processed to consecutively

9   operate only in the region of 0 to 90 degrees.

10   A reset key 266 is used to reset the set-up information. A block set-up key 267 supports to

11   set up a desired block, when partly detecting the movement of the image information displayed

12   through the main image display window 81 after setting up the block for some region in the full

13   screen. The set-up corresponding to the operation of the detailed photograph manipulation key is

14   performed by using the menu key 261.

15   If a next key 107 is selected again, the main frame replaces the screen. On the other hand,

16   since the main image display window 81 is offered for a fixed size, a separation key 83 is used when

17   the user wants to enlarge or reduce the size of the image.

18   FIG. 10 is a view showing a size variable separated image display window offered when a

19   separation key of FIGs. 7-9 is selected. As shown in FIG. 10, if the separation key 83 is selected,

20   a separated image display window 183 is loaded. If the user adjusts an edge of the window 183 by

21   dragging or dropping the mouse 55a, then the size of the window 183 is adjusted, and the size of the

1   image is also enlarged and reduced. At this time, the image is processed not to be displayed on the

2   main image window 81.

3   The controller 72 operates to be corresponded to the manipulation of the keys described so

4   far by controlling the module support unit 74, a display unit 73, and a transmitter 71 under the

5   support of the operating system 57.

6   The multichannel image driver 70 can be loaded as an inactive window when the user wants

7   to use word processor by loading the document edit application program.

8   Furthermore, there is a key 82 for setting up for the loading position of the frame 80 and 180

9   currently activated of the multichannel image driver 70, when the user loads an application program

10   besides the multichannel image driver 70. The following example is provided in order to further

11   explain the key 82 shown in FIG. 7. Let us suppose that the key 82 is selected, and then a user

12   executes a text editor program (such as notepad, wordpad, or Microsoft Word). Among the several

13   windows that are open on the display screen of the computer, the upper-most window becomes the

14   main frame 80, while the window immediately below the upper-most window becomes the window

15   for the text editor program. Thus, the user can see all of the main frame 80, but can only see some

16   parts of the text editor program window that are not hidden by the main frame 80. The key 82 relates

17   to a window viewing method which enables a user to edit a document (or perform other tasks) while

18   the security mode is performed as the main job.

19   As described so far, according to the multichannel image processor and the security system

20   employing the same, a desired security system can be established if a record medium having the

21   multichannel image driver 70 installed in a computer, and connecting the multichannel image

1   processor 30 between cameras and the computer. Accordingly, the rate of utility for resources will

2   be increased, and a separate work using the computer can be performed while watching an object,

3   and the cameras can be remotely controlled.

4   Moreover, since the image information and the manipulating apparatuses are offered together

5   on the display device of the computer, the user can manipulate for watching or recording desired

6   image information by using an input device familiar to the user him/herself.

7   While the present invention has been illustrated by the description of embodiments thereof,

8   and while the embodiments have been described in considerable detail, it is not the intention of the

9   applicant to restrict or in any way limit the scope of the appended claims to such detail. Additional

10   advantages and modifications will readily appear to those skilled in the art. Therefore, the invention

11   in its broader aspects is not limited to the specific details, representative apparatus and method, and

12   illustrative examples shown and described. Accordingly, departures may be made from such details

13   without departing from the spirit or scope of the applicant's general inventive concept.